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PATENTKANTOOR

DEPARTMENT VAN HANDERL
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PCT/ZA 2004/00154

Certificate

PATENT OFFICE

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The attached documents are true copies of the Form P2, P1, P6 and a Provisional Specification of a South African Patent application No. 2003/00618

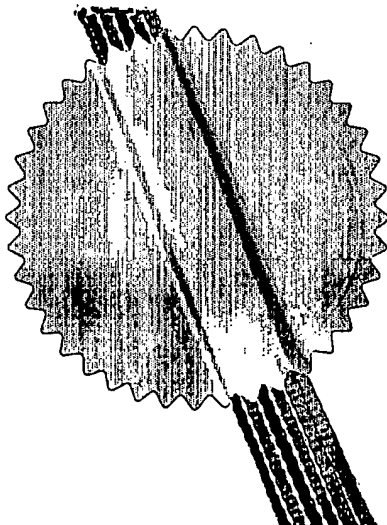
In the name of: JAN PETRUS HUMAN

Date : 27th January 2004

Entitled : MANUFACTURE OF TAMPER EVIDENT CAPS

Geteken te **PRETORIA** in die Republiek van Suid-Afrika, hierdie **20TH** dag van **DECEMBER 2006**
Signed at in the Republic of South Africa, this day of

Registrateur van Patente
Registrar of Patents



REPUBLIC OF SOUTH AFRICA

PATENTS ACT, 1978

REGISTER OF PATENTS

OFFICIAL APPLICATION NO.		LODGING DATE: PROVISIONAL		ACCEPTANCE DATE	
22	06 2004 / 06 18	22	2004 - 01 - 27		
INTERNATIONAL CLASSIFICATION		LODGING DATE: COMPLETE		GRANT DATE	
51		23		47	
FULL NAME(S) OF APPLICANT(S) / PATENTEE(S)					
71	JAN PETRUS HUMAN				
APPLICANTS SUBSTITUTED			DATE REGISTERED		
71					
ASSIGNEE(S)			DATE REGISTERED		
71					
FULL NAME(S) OF INVENTOR(S)					
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PRIORITY CLAIMED		COUNTRY		NUMBER	
		33		31	
TITLE OF INVENTION					
54	MANUFACTURE OF TAMPER EVIDENT CAPS				
ADDRESS(ES) OF APPLICANT(S) / PATENTEE(S)					
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PATENT OF ADDITION TO NO.		DATE OF ANY CHANGE			
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FRESH APPLICATION BASED ON		DATE OF ANY CHANGE			

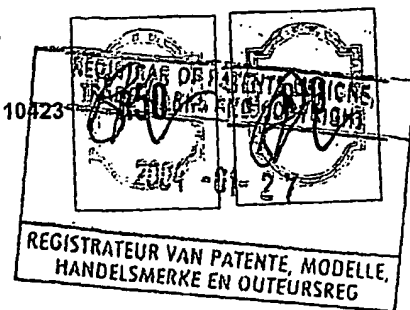
REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978
APPLICATION FOR A PATENT AND ACKNOWLEDGMENT OF RECEIPT
(Section 30(1) Regulation 22)

FORM P.1

THE GRANT OF A PATENT IS HEREBY REQUESTED BY THE UNDERMENTIONED APPLICANT
ON THE BASIS OF THE PRESENT APPLICATION FILED IN DUPLICATE

21 01 OFFICIAL APPLICATION NO. 2004/0618

BB REF: 10423



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54 TITLE OF INVENTION

MANUFACTURE OF TAMPER EVIDENT CAPS

☐ THE APPLICANT CLAIMS PRIORITY AS SET OUT ON THE ACCOMPANYING FORM P.2.
(COUNTRY) (DATE) (NO.)

☐ 21 01 THE APPLICATION IS FOR A PATENT OF ADDITION TO PATENT APPLICATION NO

☐ 21 01 THIS APPLICATION IS A FRESH APPLICATION IN TERMS OF SECTION 37 AND BASED ON APPLICATION NO

THIS APPLICATION IS ACCOMPANIED BY:

- ☐ 1. A single copy of a provisional ~~or two copies of a complete~~ specification of 10 pages
- ☐ 2. Drawings of 5 sheets
- ☐ 3. Publication particulars and abstract (Form P.8 in duplicate).
- ☐ 4. A copy of Figure of the drawings (if any) for the abstract.
- ☐ 5. An assignment of invention
- ☐ 6. Certified priority document(s). (State number)
- ☐ 7. Translation of the priority document(s)
- ☐ 8. An assignment of priority rights
- ☐ 9. A copy of Form P.2 and the specification of RSA Patent Application No
- ☒ 10. Form P.2 in duplicate
- ☒ 11. A declaration and power of attorney on Form P.3
- ☐ 12. Request for ante-dating on Form P.4
- ☐ 13. Request for classification on Form P.9
- ☐ 14.

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DATED THIS 26th DAY OF January 2004

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APPLICANTS PATENT ATTORNEYS
The duplicate will be returned to the applicant's address for service as
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REGISTRATEUR VAN PATENTE, MODELLE,
HANDELSMERKE EN OUTEURSREG

REGISTRAR OF PATENTS

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REPUBLIC OF SOUTH AFRICA
Patents Act, 1978

PROVISIONAL SPECIFICATION

(Section 30 (1) – Regulation 27)

21	01	OFFICIAL APPLICATION NO
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22	LODGING DATE
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2004 -01- 27

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71	FULL NAME(S) OF APPLICANT(S)
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72	FULL NAME(S) OF INVENTOR(S)
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JAN PETRUS HUMAN

54	TITLE OF INVENTION
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MANUFACTURE OF TAMPER EVIDENT CAPS

FIELD OF THE INVENTION

THIS INVENTION relates to tamper evident caps for containers.

BACKGROUND TO THE INVENTION

In the specification of my South African Patent Application No.

5 2003/9654 I disclose a cap comprising an end wall and a cylindrical skirt. The free
edge zone of the skirt is in the form of a band which is joined to the remainder of the
skirt by a series of bridges. When the band is heated after the cap has been applied
to a container, the band shrinks and pulls tight around the container. The band
prevents the cap being removed from the container, and an attempt to remove the
10 cap breaks the band thus providing evidence of tampering.

The present invention provides a new and inventive method of
manufacturing a cap as described above.

BRIEF DESCRIPTION OF THE INVENTION

15 According to one aspect of the present invention there is provided a
tamper evident cap which comprises a transverse end wall and a cylindrical skirt, the
end portion of the skirt being in the form of a band joined to the remainder of the
skirt by a series of bridges, the band having been stretched during manufacture and
being of a material which shrinks when it is heated.

According to a further aspect of the present invention there is provided a tool for use in the manufacture of a tamper evident cap, the tool comprising a female mould and a mandrel which together define a mould cavity having the shape of the cap to be moulded, the mould cavity having a first part in which the greater part of the length of the skirt of the cap and a transverse end wall of the cap are moulded, a second part in which a band forming the end part of the skirt of the cap is moulded, and notches arranged in a circle, the notches joining the cavity parts and a series of bridges between the band and remainder of the skirt being moulded in these notches, the inner diameter of at least a portion of the subsidiary cavity part being less than the inner diameter of at least a portion of the main cavity part.

According to a still further aspect of the present invention there is provided a method of moulding a cap which comprises feeding synthetic plastics material to a mould cavity defined between surfaces of a mandrel and surfaces of a female mould, the mould cavity having the shape of the cap to be moulded, the mould cavity having a first part in which the greater part of the length of a skirt of the cap and a transverse end wall of the cap are moulded, a second part in which a band forming the end part of the skirt is moulded, and notches arranged in a circle and which join the cavity parts, the inner diameter of at least a portion of the subsidiary cavity part being less than the inner diameter of at least a portion of the main cavity part, and removing the moulded cap from the mandrel in such manner that the band is stretched as it passes over the part of the mandrel which defines the first part of the mould cavity.

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According to another aspect of the present invention there is provided a preform from which a container can be blown, the preform being of a heat shrinkable material and having a circumferentially extending flange encircling the neck and protruding therefrom, there being a band upstanding from the flange, the band encircling the neck and being connected to a face of the flange by way of a series of bridges.

The neck can have a bead adjacent the flange, the bead being positioned so that on shrinking of the band onto the neck, a part of the band is between the bead and the open mouth of the bottle.

The invention also extends to a capped container blown from a preform as defined above, the cap having the free edge of its skirt gripped between the band and the neck of the container. The skirt can have a protruding bead that the band shrinks onto to prevent the skirt being withdrawn from the band without breaking it.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings in which:-

Figure 1 is a section through a cap;

Figure 2 is an axial section through a closed tool for use in manufacturing the

cap;

Figure 3 shows the tool immediately after it has been opened;

Figures 4a, 4b and 4c are sequence drawings showing a cap being rotated off a mandrel forming part of the tool of Figures 2 and 3; and

5 Figure 5 illustrates a preform and a cap.

DETAILED DESCRIPTION OF THE DRAWINGS

The cap C shown in Figure 1 has a transverse end wall EW and a cylindrical skirt designated S. The skirt comprises a main part P and a subsidiary part in the form of a band B. The band B is joined to the skirt part P by way of a series of bridges SB. There are openings O between adjacent bridges. The configuration of the cap C will be described in more detail hereinafter. On the inside of the skirt part P there is a helical thread HT.

The tool 10 illustrated in Figures 2 and 3 comprises a female mould 12 and a male mandrel 14. The mould 12 comprises two parts designated 16.1, 16.2.

15 The mould 12 has a cavity 18 (see particularly Figure 3) bounded by a transverse end surface 20 and a cylindrical side surface 22.

The part 16.2 of the female mould 12 has a runner 24 through it and a sprue 26 connecting the runner 24 to the cavity 18 of the mould 12.

The mandrel 14 comprises a cylindrical core 28 with a stem 30

protruding from it. The mandrel 14 also comprises a rod 32 which is co-axial with the core 28 and the stem 30 and is both rotatable and axially shiftable relative thereto and a ring 34 which encircles the core 28 and the stem 30.

5 The core 28 and rod 32 define a composite end surface 36 which faces the surface 20 of the female mould 12. The core 28 also has a cylindrical side surface 38 which faces the surface 22 of the mould 12. The surface 38 has one or more helical grooves 40 cut into it.

The surfaces 20, 36 are parallel and spaced apart. Likewise the surfaces 22 and 38 are parallel and spaced apart.

10 The surface 38 of the core 28 intersects a conical surface 42 of the core along a circular line of intersection 44. The surface 42 tapers from the circular line of intersection 44 towards a flat, annular surface 46 where the stem 30 protrudes from the core 28.

15 The bore in the ring 44 has an inner surface 48 which tapers at an angle which is somewhat less than the angle of taper of the surface 42. Thus the surfaces 42 and 48 diverge from one another in the direction away from the circular line 44. The surface 48 extends from the end face 50 of the ring 44 to an internal transverse surface 52. The tapering surface 48 has a series of notches 54 therein immediately adjacent the end face 50.

When the mould is closed, as shown in Figure 2, the circular edge 44 touches the surface 48 of the ring 34. This divides the mould cavity into a main part, designated X1, and a subsidiary part, designated X2, which are only in communication with one another through the notches 54.

5 The end of the rod 32 is formed with a cross shaped indentation 56 (see particularly Figure 4c).

Synthetic plastics material of a type which can be shrunk by the application of heat is injected through the runner 24 and sprue 26. PET (polytetrafluoroethylene) is a suitable material.

10 The main cavity part X1 fills with material which eventually flows through the notches 54 and into the subsidiary cavity part X2.

Once the injected material has set, the mould is opened by separating the mould 12 and mandrel 14. The mandrel 14, but not the mould 12 is shown in Figure 4a with a cap C on the mandrel 14.

15 The ring 34 is then displaced with respect to the core 28. Such linear motion is converted to rotary and translational motion of the rod 32. The cap C and rod 32 are interconnected due to the plastics material in the indentation 56.

Thus the cap C is turned with respect to the core 28 (Figure 4b) and is

eventually screwed off the stationary core by virtue of the helical thread TH which the threading 40 has moulded into the inside surface of the cylindrical wall of the cap (see Figure 1). As will clearly be seen from Figure 3, the band B has to be expanded outwardly to permit the cap to be taken off the core 28 of the mandrel 14.

5 The band B is thus stretched during manufacture and consequently at the time the cap reaches the bottling plant, the band B is cylindrical and forms an extension of the main part P of the skirt S.

Once the cap has been screwed onto a container and then heated, the band B shrinks back to its unstretched condition (as shown in Figure 1) and tightly grips the container. Re-heating makes the band and bridges brittle. There is usually a protruding circumferentially extending bead between the open mouth of the container and the band, and the band pulls tightly under this bead.

Experimental work shows that the band splits axially, and/or all the bridges break, immediately any attempt is made to remove the cap from the container.

It is possible to omit the runner and sprue and to use the technique known as compression moulding to manufacture the cap. Specifically a charge of plastics material is fed into the open cavity 18 and the mould is then closed to force material into the parts X1 and X2 of the mould and into the notches 54 which join the cavity parts.

To facilitate removal of the cap from the mandrel, the core 28 can taper very slightly from top to bottom (as viewed in Figure 2). Similarly, the thread HT can taper so that its dimensions reduce in the top to bottom direction.

5 Turning now to Figure 5, this illustrates a PET preform 58 from which a bottle can be blown. The preform has a flange 60 with a band 62 moulded integrally with it. The connection between the flange 60 and the band 62 is in the form of a series of bridges 64 with gaps 66 between them.

The cap C has a series of slits 68 in the free edge of the skirt 70. Externally of the skirt there is a protruding rib 72.

10 When the cap C is screwed onto the container blown from the preform, the edge of the skirt 70 enters the annular gap bounded by the band 62 and the neck of the container above the flange 60.

15 On heating of the band, it shrinks onto the skirt above the rib 72 thereby firmly securing the skirt to the container. Unscrewing of the cap causes the rib 72 to force the now brittle band 62 outwardly breaking it along a line running across the band and/or breaking the bridges 64.

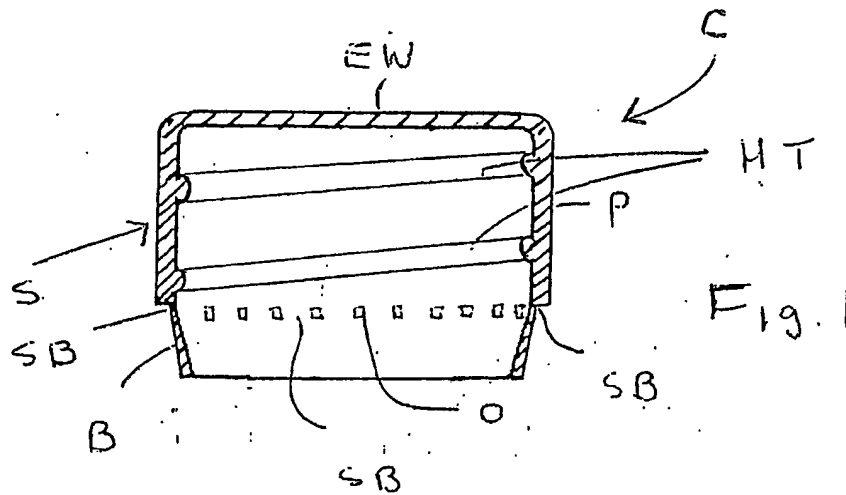
The band is preferably moulded with an inward lean towards the neck. The part of the mandrel which moulds the inner surface of the band is tapered. This ensures that as the mould is opened, the band is stretched by being expanded

-10-

outwardly. Such stretching promotes later shrinkage under heating.

Dated this 26th day of January 2004


Brian Bacon & Associates
Applicant's Patent Attorney



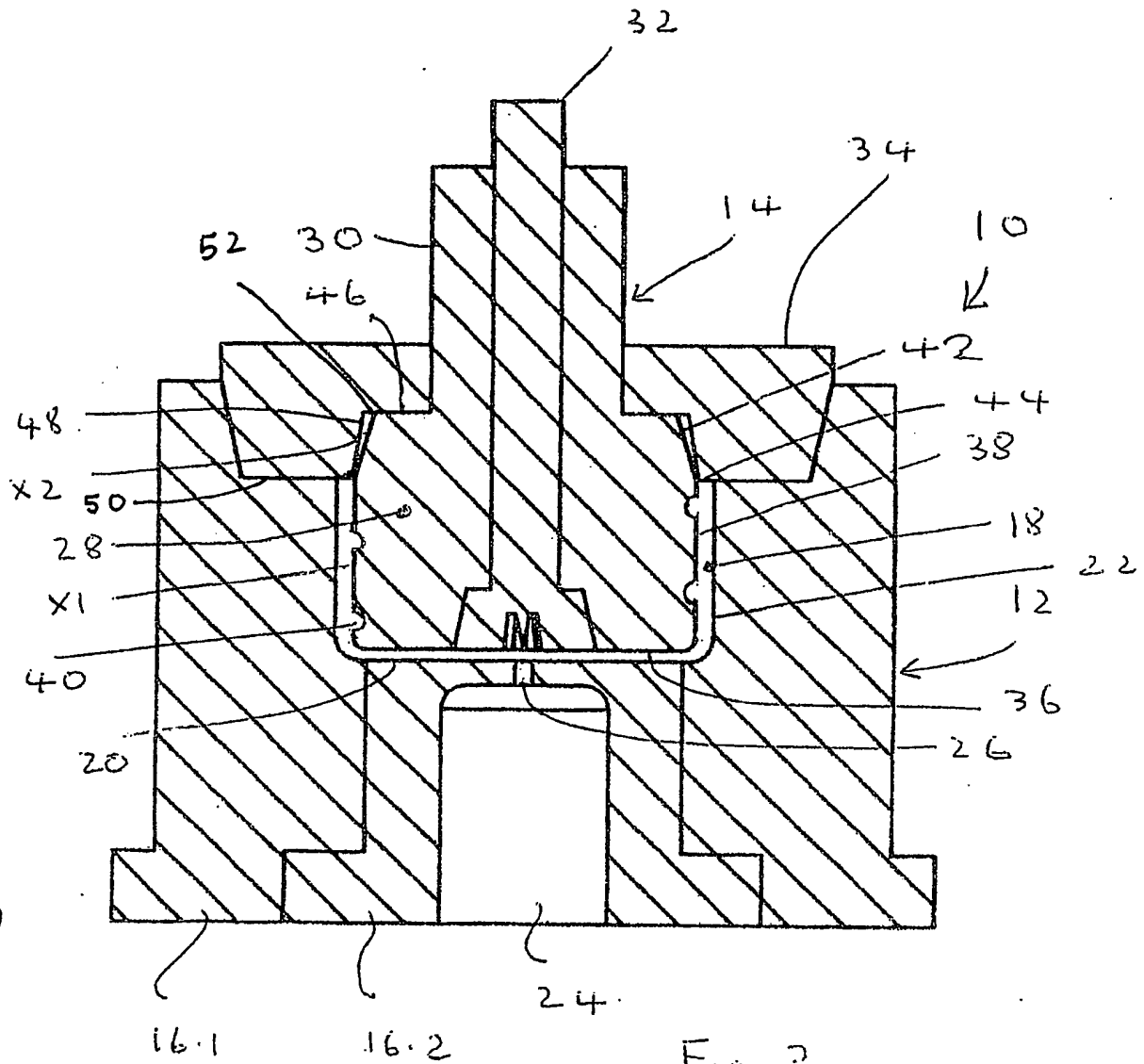
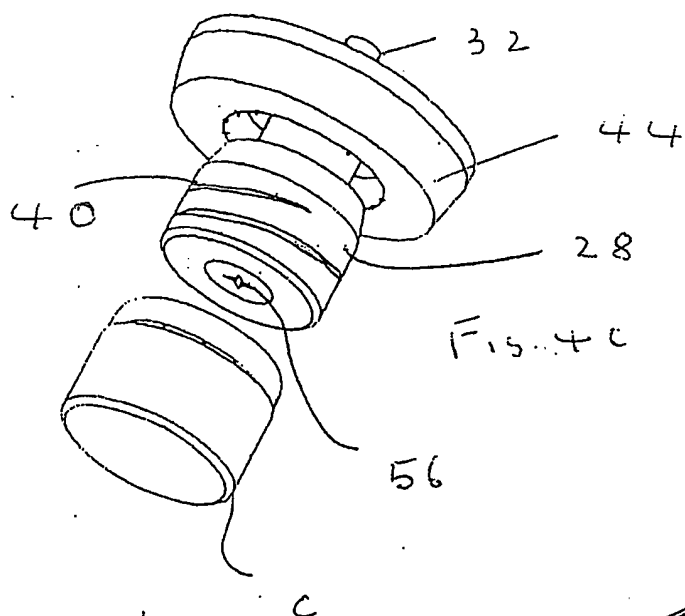
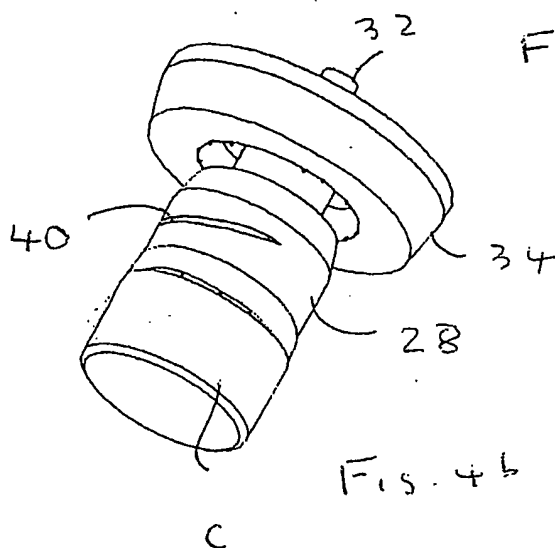
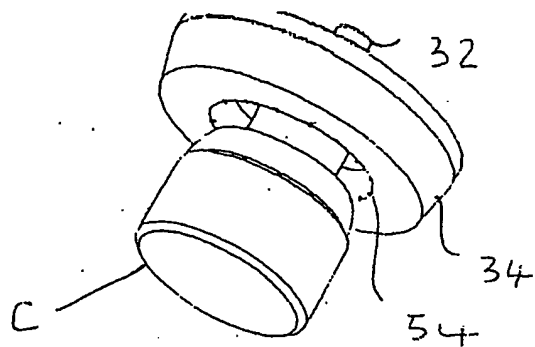
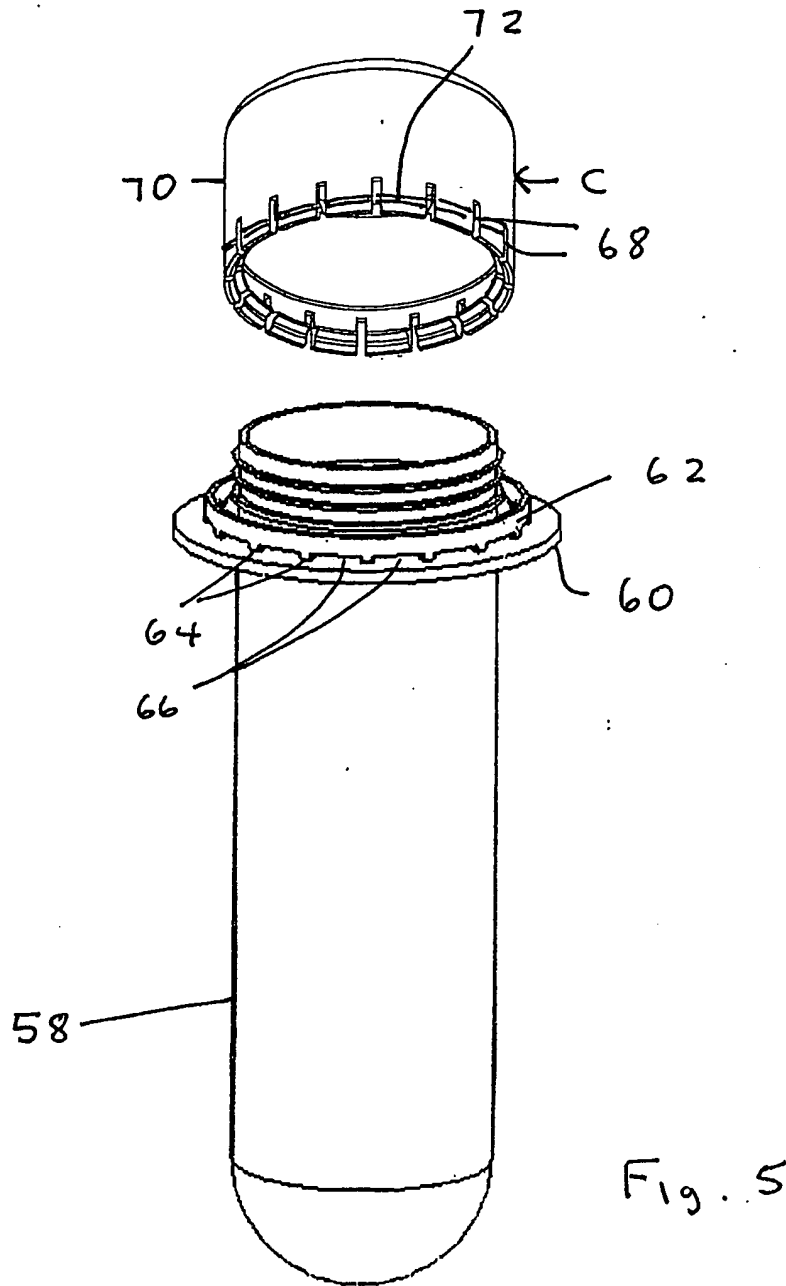


Fig. 2




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